

# इंटरनेट

# मानक

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IS 11654-3-406 (1989): Flexible insulating sleeving, Part 3: Specifications for individual type of sleeveings, Section 406: Glass textile sleeving with PVC based coating high breakdown strength [ETD 2: Solid Electrical Insulating Materials and Insulation Systems]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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*Indian Standard*

## SPECIFICATION FOR FLEXIBLE INSULATING SLEEVING

### PART 3 SPECIFICATIONS FOR INDIVIDUAL TYPES OF SLEEVINGS

Section 406 Glass Textile Sleaving with PVC Based Coating — High  
Breakdown Strength

भारतीय मानक

नम्य विद्युत्तरोधन स्लोविंगों की विशिष्टि

भाग 3 अलग-अलग स्लोविंग

अनुभाग 406 पी वी सी आधारित लेपनयुक्त उच्च भंजन सामर्थ्य वाली कांच वस्त्रादि की स्लोविंग

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BUREAU OF INDIAN STANDARDS  
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NEW DELHI 110002

July 1990

Price Group 2

## FOREWORD

This Indian Standard ( Part 3/Sec 406 ) was adopted by the Bureau of Indian Standards on 25 October 1989, after the draft finalized by the Solid Electrical Insulating Materials Sectional Committee had been approved by the Electrotechnical Division Council.

This standard deals with flexible insulating sleeveings. It consists of the following three parts;

Part 1 Definitions and general requirements,

Part 2 Methods of tests, and

Part 3 Specifications for individual types of sleeveings.

This standard covers the requirements for glass textile sleeving with PVC based coating high breakdown strength.

This standard should be read in conjunction with IS 11654 ( Part 1 ) : 1986 'Specification for flexible insulating sleeving: Part 1 Definitions and general requirements' and IS 11654 ( Part 2 ) : 1986 'Specification for flexible insulating sleeving: Part 2 Methods of test'.

In the preparation of this standard, assistance has been derived from IEC Doc : 15C ( Central Office ) 199, Sheet 406 glass textile sleeving with PVC based coating high breakdown strength, issued by the International Electrotechnical Commission ( IEC ).

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# *Indian Standard*

## SPECIFICATION FOR FLEXIBLE INSULATING SLEEVING

### PART 3 SPECIFICATIONS FOR INDIVIDUAL TYPES OF SLEEVINGS

#### Section 406 Glass Textile Sleaving with PVC Based Coating — High Breakdown Strength

#### 1 SCOPE

**1.1** This standard ( Part 3/Sec 406 ) covers the requirements for temperature index 105, glass sleaving using either braided or knitted construction coated with a continuous flexible coating based on polyvinyl chloride (PVC) or its co-polymers for blends thereof high break-down strength.

#### 2 REFERENCES

**2.1** The following Indian Standards are necessary adjuncts to this standard.

<i>IS No.</i>	<i>Title</i>
8504 ( Part 1 ) : 1977	Guide for determination of thermal endurance properities of electrical insulating materials: Part 1 Temperature indices and thermal endurance profiles
10810 ( Part 53 ) : 1984	Methods of test for cables: Part 53 Flammability test
11654 ( Part 1 ) : 1986	Specification for flexible insulating sleaving: Part 1 Definitions and general requirements
11654 ( Part 2 ) : 1986	Specification for flexible insulating sleaving: Part 2 Methods of test

#### 3 DESIGNATION

**3.1** Sleaving covered in this standard shall be identified as given in **3.1** of Part 1 of this standard.

For example, IS 11654-3-406 Nominal bore size in mm—Colour code [ Colour code shall be as given in **3.2** of IS 11654 ( Part 1 ) : 1986 ]

#### 4 COLOUR

**4.1** Sleaving is normally available in the colours: black, white, red, yellow, blue, green, brown and green/yellow.

#### 5 REQUIREMENTS

**5.1** In addition to the general requirements given in IS 11654 ( Part 1 ) : 1986 requirements specified in this standard shall also be applicable.

#### 5.2 Dimensions

The sleaving shall comply with the dimensional requirements given in Table 1.

#### 5.3 Bending After Heating

When tested in accordance with **13** of IS 11654 ( Part 2 ) : 1986, there shall be no cracking or detachment of coating visible after bending around mandrels as shown in Table 2 after 96 hours at 130°C.

#### 5.4 Bending at Low Temperature

When tested in accordance with **14** of IS 11654 ( Part 2 ) : 1986, there shall be no cracking or detachment of coating visible after bending around mandrel as shown in Table 2 while at -25°C.

#### 5.5 Thermal Stability

When tested in accordance with Method 'A' in **11** of IS 11654 ( Part 2 ) : 1986 the indicator paper shall not show the change in colour in less than 20 minutes while at 200°C.

#### 5.6 Resistance to Solering Heat

When tested in accordance with **7** of IS 11654 ( Part 2 ) : 1986, the sleaving shall not show sign of splitting.

NOTE — This test shall be applicable for sleaving having nominal bore dia up to and including 5 mm.

#### 5.7 Thermal Endurance, TI

When tested in accordance with IS 8504 ( Part 1 ) : 1977, TI at 20 000 hours shall be minimum 105.

#### 5.8 Flammability

When tested applying IS 10810 ( Part 53 ) : 1984, in accordance with **27** of IS 11654 ( Part 2 ) : 1986.

**Table 1 Dimensions**

( Clause 5.2 )

Nominal Bore mm	Tolerance on Bore mm		Wall Thickness mm	
	Bilateral ( $\pm$ )	Unilateral ( $\pm$ )	Min	Max
(1)	(2)	(3)	(4)	(5)
0.3	0.05	0.10	0.20	0.30
0.5	0.10	0.20	0.25	0.50
0.8	0.10	0.20	0.25	0.50
1.0	0.15	0.30	0.25	0.90
1.5	0.15	0.30	0.35	0.90
2.0	0.20	0.40	0.35	0.90
2.5	0.20	0.40	0.40	0.90
3.0	0.25	0.50	0.40	0.90
4.0	0.25	0.50	0.50	0.90
5.0	0.25	0.50	0.50	0.90
6.0	0.25	0.50	0.50	0.90
8.0	0.50	1.0	0.50	1.20
10.0	0.50	1.0	0.65	1.20
12.0	0.50	1.0	0.65	1.20
16.0	0.50	1.0	0.65	1.20
20.0	0.50	1.0	0.65	1.20
25.0	0.50	1.0	0.65	1.20

NOTE — Only positive tolerance may be used, if agreed to between the purchaser and the supplier.

Flammability shall be minimum 60 seconds. In addition, the indicator flag on these tests shall not be burned away and cotton shall not get ignited by flaming or glowing drippings.

**Table 2 Mandrel Diameter for Bending Tests**

( Clauses 5.3 and 5.4 )

Nominal Bore mm	Mandrel Diameter mm	
	After Heating	At Low Temperature
(1)	(2)	(3)
0.3	2	2
0.5	3	3
0.8	4	4
1.0	5	5
1.5	6	6
2.0	8	8
2.5	10	10
3	12	12
4	15	15
5	18	18
6	21	21
8	27	27
10	33	6
12	40	6
16	6	6
20	6	6
25	6	6

**5.9 Breakdown Voltage**

**5.9.1** Breakdown voltage shall be determined by any of shot bath test given in 21.2 and straight mandrel test, 25 mm electrode given in 21.2 of IS 11654 ( Part 2 ) : 1986.

**5.9.2** The rate of voltage application shall be 500 V/second or such that the required breakdown value is reached between 10 and 20 seconds.

**5.9.3** The requirements of breakdown voltage at room temperature, elevated temperature and damp heat when measured in accordance with 21.7 of IS 11654 ( Part 2 ) : 1986, shall be as given in Table 3.

**5.10 Insulation Resistance****5.10.1 Insulation Resistance at Room Temperature**

When tested in accordance with 22 of IS 11654 ( Part 2 ) : 1986, the insulation resistance shall be  $10^3 M\Omega$  ( minimum ).

**5.10.2 Insulation Resistance after Temperature Heat**

When tested in accordance with 22 of IS 11654 ( Part 2 ) : 1986, the insulation resistance shall be  $10^2 M\Omega$  ( minimum ).

**Table 3 Requirements for Breakdown Voltage**  
( Clause 5.9.3 )

	Shot Bath Test Using Straight Mandrel 25 mm Electrode		Straight Mandrel with 25 mm Electrode	
	Central Value ( kV )	Lowest Individual Value ( kV )	Central Value ( kV )	Lowest Individual Value ( kV )
Breakdown voltage kV ( Min )				
a) At room temperature	5.0	4.0	7.0	5.0
b) Elevated temperature ( 130°C )	2.8	2.2	2.0	1.5
c) After damp heat	2.5	2.0	2.8	1.0

**5.11 Mould Growth**

shall apply.

In case of agreement between the purchaser and the supplier, this requirement shall be tested for Scale 1 in accordance with IS 11654 ( Part 2 ) : 1986.

**6 PACKAGING**

**6.1** Provisions of **9.1** of IS 11654 ( Part 1 ) : 1986,

**7 MARKING**

**7.1** In addition to the details given in **10** of IS 11654 ( Part 1 ) : 1986 following information shall be labelled:

**Construction of the Sleeving** — braided or knitted.



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**FLEXIBLE INSULATING SLEEVING**  
**PART 3 SPECIFICATIONS FOR INDIVIDUAL TYPES OF**  
**SLEEVINGS**

**Section 406 Glass Textile Sleeving with PVC Based Coating —**  
**High Breakdown Strength**

*( Page 2, Table 1, Note ) — Delete the Note.*

( ETD 02 )

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